

2009

2009 Newsletter

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Sternheim, Morton, "2009 Newsletter" (2009). *STEM Education Institute Newsletters*. 7.
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STEM Ed



2009 VOL. 12 NO. 1

Published by the
STEM Education Institute
University of Massachusetts
225 Hasbrouck Laboratory
University of Massachusetts
Amherst, MA 01003

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STEM Ed newsletters are
online at: www.umassk12.net/stem/newsletter/

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FROM THE DIRECTOR MORTON STERNHEIM

ANOTHER CAREER DIRECTION?

As you may know, I am a “retired” theoretical nuclear physicist. I taught a few lab sections as a graduate student, but since then my only contact with teaching or research laboratories has been as a very infrequent visitor. Thus it surprises some people, including me, to find that I am now involved in developing hands-on student experiments.

My involvement in efforts to improve STEM Education came about through my interest in computers and their role in education. My role in programs dating back over two decades has been as a grant writer, organizer, and technology leader. However, in planning our current Nanotechnology and International Polar Year STEM Connections Summer Institutes, I have created or adapted a series of lab activities.

The reason for this change is that in our previous programs our school and college presenters were able to dip into a large base of educational materials developed for K12 and college classrooms. The current workshops are much closer to the research frontiers. Nobody has taught nanotechnology or global warming for very long, and the quantity and quality of relevant existing educational material is limited. This presented a new challenge to me and to our institute staffs, and I found myself engaged in creating experiments.

*The
current
workshops
are much
closer
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research
frontiers.*

The best example of what I have tried to do is provided by a series of experiments relating to albedo – the fraction of the incident sunlight that is reflected back to space – and its relationship to global warming. The albedo is much higher for snow and ice than for water. In the Arctic, as sea ice melts and is replaced by open water, the albedo diminishes. More energy is absorbed and warming accelerates. This is a form of positive feedback and is one reason that climate change is fastest in polar areas. As a physicist, I found this interesting and thought about how to measure the albedo and the related energy absorption. I worked on this problem off and on for almost two years and eventually found several good ways to explore these issues.

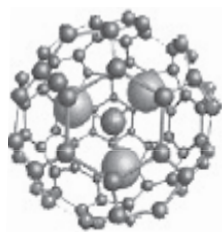
I kept in mind that our teacher institute activities must satisfy several sometimes conflicting criteria:

1. They should be engaging and get the students interested in what will happen.
2. They should illuminate important concepts – be related to frameworks, etc.
3. They should be adaptable to multiple grade levels, subject areas, and teaching styles. We get a very heterogeneous mix of teachers.
4. They should be easy to prepare and manage; teachers don't have lab assistants.
5. They should be free or inexpensive – teacher budgets are small or nonexistent.

We avoid high tech experiments that normally can only be done in college labs.

continued on page 6





NANOTECHNOLOGY
A Summer Institute for
Science, Math, and Technology Teachers
at the
University of Massachusetts
in Amherst, MA



2009 Institute

The third NSF funded Nanotechnology Summer Institute was held in the new Integrated Sciences Building at UMass Amherst July 20-24, 2009. Thirty-two teachers participated, and about 10 more remained on a waiting list. The popularity of the subject and the enthusiasm of those who attended earlier institutes generated an overfull roster with minimal email and web site publicity.

Teachers attending the institute were given stipends, materials allowances, free PDP's (Professional Development Points) or low cost graduate credits, some meals, and housing if they lived beyond the commuting radius. Twenty of the participants were from Massachusetts. The others came from Florida, New Hampshire, Oklahoma, Virginia, North Carolina, New York, Rhode Island, and Vermont; one came from Pavullo, Italy. This is impressive since most of these people had to cover their own travel costs, which were not included in our budget. Their grade levels and subject areas were quite varied, with the majority teaching high school science, technology, or math.

The institute staff included a team of UMass and school faculty. The agenda featured PowerPoint presentations, hands-on experiments, multi-media modules, small group discussions, a lab tour, a "virtual clean room tour," and web explorations. We made connections to state and national frameworks, and included a session on the societal implications of nanotechnology.

COMMENTS FROM THE PARTICIPANTS

"Fabulous workshop. Every instructor was so enthusiastic. The people who took this class were wonderful. This was – hands down- up there with my top 3 best workshops."

"Nano can be a scary word and the workshop did a good job of shedding light on it"

"This ranks as one of the best workshops I have attended:

- 1) for the quantity of topics covered*
- 2) for the clear way they were presented*
- 3) for the expertise of the instructors*
- 4) for the incredibly good planning at every level.*

[You were] careful to include such a balanced cross discipline set of presentations and to have them all online saves lots of paper chasing and frustration. Thanks for all of it!"



Our very extensive website, www.umassk12.net/nano, provided PowerPoint or Word versions of all our presentations and student and teacher handouts. These formats permit teachers to extract or modify the portions they need for their students. We also included links to other relevant resources, information on purchasing materials, and a photo gallery.

Agenda highlights provide some idea of the institute's scope:

DAY 1

Nanotechnology overview, start nanomedicine gelatin diffusion experiment, Was Benjamin Franklin the First Nanotechnologist, oleic acid nanofilms, nanofilters for clean water, powers of ten, societal issues jigsaw assignment

DAY 2

Why size matters, atomic force microscope, nanoparticles and sunscreen, curriculum design project, web explorations. Evening barbeque.

DAY 3

Self assembly, magnetic memory, magnetism module, lab tour, virtual clean room tour, nano impact, applications, careers.

Day 4

Societal issues jig saw, lithography and electrodeposition, academic year planning.

DAY 5 Gelatin diffusion conclusion, nanomedicine, poster session on academic year plans. Evaluation focus groups. ■

**2010 NANOTECHNOLOGY SUMMER INSTITUTE -
JUNE 28-JULY 2**

IMPRESSIONS FROM ITALY

BY ANNAMARIA LISOTTI, 2009 NANOTECHNOLOGY SUMMER INSTITUTE PARTICIPANT

Was that worth it? It surely was!!

"All the way from Italy to attend the Nanotech Summer Institute?" was the recurring question throughout the course. I could hardly blame the puzzled look in my USA colleagues, but yes... all the way for that!

And thanks to Professor Sternheim and his staff for giving me the chance!

I've attended quite a few international seminars and workshops recently, but always in Europe and targeting European teachers. The European Union is actually putting a huge effort into education according to LLP (Lifelong Learning Program) and one of the goals is having teachers from different countries meet, mix and exchange both professional and cultural views. I just longed for going one step beyond, so when I surfed the net researching nanotech and the UMASS call for applications popped up on the screen, I thought "that's it!"

I went through the course week drinking litres of black American coffee, wondering why I still fell asleep all the time, fighting with the lock in the dorms, trying to understand the difference between K-12, 9th grade and so on because there's really no equivalent system in Italy and enjoying the feeling of being, just for this time, the "exotic one" in the course being adopted by everyone.

But what really impressed me about the institute and surely set it apart from my previous experiences were the many hands-on activities presented. All of them were really perfect for use in my school; somehow in other such courses the recurrent feeling is that some of the trainers have never really put foot in classrooms and managed to work with real teenagers. I also appreciated the great flexibility: most experiments can be easily tuned to very different grade levels. I also appreciated the accompanying PowerPoint presentations focusing on cutting edge science that were so clear and complete. This is something only researchers actually working on the topic can truly achieve.

I'm planning to integrate the very interesting and successful AFM modelling activity presented in this summer institute in my advanced optics course together with an electron microscope and diffraction activity to introduce devices used at nano scale. I do think I'll be able to try it on students at very different levels from juniors to higher as well as mathematically sophisticated ones.

Often enough even our most brilliant students ask "why are we doing this?" The gel casts experiment on diffusion, for example, could score a good point in answering them and make them feel excited about research work.

In Italy, physics in school is still mostly theoretical and many teachers think that as long as lab activities are not "hard" enough from a mathematical point of view then they are not serious nor worth doing. Such activities as those proposed at the Nanotech Institute had the right amount of



math if one wants to go into it with older and more skilled students. I am thinking of using electro-deposition and gel cast activities to introduce my 2nd year students to the concept of rate connected to derivatives mostly from a graphical point of view, but they still prove significant and worth doing at a more qualitative level. The leading idea is that you can do difficult things in a simple way by letting students get a glimpse of frontier research topics with modelling activities, discarding the concept (so strong still in my country) of a strictly sequential curriculum. This has had the depressing result that most of our 19 year olds come out of high school with no idea at all of what's going on in physics since Maxwell or, at the very best, Fermi. And these are the future citizens who are supposed to go and vote with a conscience on global challenges. I was also impressed that most of the nano applications shown in the course were related and respond to current problems such as water shortages, the fight against cancer, energy needs, etc., a sure sign of the dedication and commitment of the course organizers.

Last, but not least, I also learned a lot by talking and exchanging ideas with my USA colleagues and actually working together with them. For instance, I'm planning to use the jigsaw activity in my next European meeting in a renewables project I coordinate in order to have a quick and efficient info exchange about state of the art science in each country.

I do hope it will be possible for me to have more of such rewarding and enriching experiences. Somehow in a globalized world with globalized challenges it would be nice to have more exchanges between teachers of different continents and backgrounds, instead of Europe and USA going along separately in education. And why not? Maybe some time soon someone from the USA will travel all the way round to the old continent for a similar experience and be kept wide awake by a cup of espresso.

Annamaria Lisotti is a math and physics teacher at Liceo Scientifico Sorbelli, Pavullo Modena Italy, collaborating on didactic research with the Physics Department of Modena and Reggio Emilia University. ■

Nanotech Summer Institute 2009 Participants -
see page 6 for complete listing

IPY STEM

POLAR CONNECTIONS INSTITUTE

BY HOLLY HARGRAVES

This summer, for the second year, STEM Ed and the UMass Climate System Research Center (CSRC) hosted a one-week science-teacher education program for teachers to study the Polar Regions and climate change in association with the International Polar Year (IPY). Supported by the National Science Foundation, IPY STEM Polar Connections was an initiative to integrate activities associated with the International Polar Year into the middle and high school curriculum. This curriculum development and professional development program was held at UMass Amherst from June 28th to July 2nd.

Thirty educators from five different states attended, including three from New York and one from Ohio. Participants living outside the commuting distance stayed in the North Residential Housing area on campus. A \$375 stipend was offered to participants, along with the opportunity for reduced cost credit or free professional development points. This year the Institute was held at the newly constructed Integrated Sciences Building, directly across the street from Hasbrouck Laboratory.

Led by STEM Ed Director Morton Sternheim, and Professor Julie Brigham-Grette, an internationally known geologist, the institute's staff also included climatologist Dr. Ray Bradley, retired high school teachers Rob Snyder and Holly Hargraves, Project Manager and science educator Marie Silver; and doctoral student Beth Caissie. A combination of lecture, discussion, and a variety of hands-on activities during the week was packed with opportunity for learning and curriculum development. Two of the participants had prior experience with programs focusing on climate and/or Polar Regions. Time was provided for Massachusetts teacher Kathy Gorski and New York teacher Ken Huff to share their experiences.



Topics for the institute included Climate Change and its impact on Polar Regions and the world, Polar animals, the history of Polar Exploration, the politics of the Arctic and the Northwest Passage, and personal anecdotes of actual research conducted by Brigham-Grette, Bradley, and Caissie. Lab activities were varied and designed for teachers to adapt for their own classrooms. Topics for labs included density, sea ice, albedo, remote sensing, and watershed analysis.

Teachers were introduced to sets of STEM Polar Connections Modules that emphasized the process of scientific inquiry, and they explored a variety of proven techniques for effective teaching, including inquiry-based teaching, cooperative learning, and methods for formative assessment of student learning. By the end of the institute, the teachers were beginning to make plans for implementation of new lessons into their curriculum and for the development of workshops and presentations for other teachers in their districts, or at state or national venues.

Guest lecturers included Craig Nicolson, Assistant Research Professor, Department of Natural Resource Conservation, who spoke about remote sensing and the tracking of Bowhead whales and caribou herds; Lisa Wexler, Assistant Professor, Department of Public Health, who discussed the people of the Arctic; and Robin Bell, Senior Research Scientist, Lamont-Doherty Earth Observatory of Columbia University and Chair of the IPY Polar Research Board who provided personal anecdotes about her years of Polar research.

Teachers provided overwhelmingly positive feedback about this institute and expressed appreciation to the staff for the well organized and interesting material, including an impressive amount of material put online on the Institute's website, <http://umassk12.net/ipy>. A third and final summer institute will be offered July 12-16, 2010. ■

IPY 2009 PARTICIPANTS

Terry Atkinson, Science/Greenfield Middle School, Greenfield, MA
Suzanne Avtges, Biology, Marine, Mashpee H.S., Mashpee, MA
Robin Bardun, Chem/ Physics, Claymont H.S., Uhrichsville, OH
James Brown, Math/Science, Sand Creek M.S., Albany, NY
Lisa Bruso, Physics/Biology, Chicopee H.S., Chicopee, MA
Rita Chang, Earth Science, Wellesley H.S., Wellesley, MA
Christina Ciarametaro, Earth Science, Ipswich M.S., Ipswich, MA
Joshua Copen, Chem./Env. Sci., Putnam Voc Tech, Springfield, MA
Kathleen Gorski, Science, Wilbraham & Monson Acad., Wilbraham, MA
Daniel Guertin, Biology/Ecology, Ralph C. Mahar, Orange, MA
Mike Hansen, Life Science, Linden M.S., Malden, MA
Robin Harrington, LifeSci./Physical, Amherst Regional, Amherst, MA
Kenneth Huff, Science/Social Stud., Mill M.S., Williamsville, NY
Sandra Johnson, Life Science, Agawam Jr. H.S., Feeding Hills, MA
Barbara Lamay, All subjects, Florence Learning, Florence, MA

William Long, Biology, Anatomy, Doherty H.S., Worcester, MA
James McGinn, General Science, Uptown School, Atlantic City, NJ
Brianna Miller, Chemistry, Middletown H.S., Middletown, PA
Carol Mutchler, Physical Sci., Wilmington H.S., Wilmington, MA
Jayshree Oberoi, New England Aquarium, Boston, MA
Susan Reyes, NESEA, Greenfield, MA
Christine Robinson, General Science, Springfield, MA
Stephanie Ann Scherr, Env. Science, Narragansett, Baldwinville, MA
Laura Schofield, Geology, Ipswich M.S., Ipswich, MA
Mark Scott, Earth/Env. Sci., West Springfield, West Springfield, MA
Emily Sherman, Env. Sci., Scarborough H.S., Scarborough, ME
Neal Singh, Earth/Env. Sci., LaGuardia H.S., New York, NY
Amy Sternheim, General Sci Education Student, UMass, Amherst MA
William Van Valkenburg, Science/Biology, Gardner H.S., Gardner, MA
Heather Yacek, Math/Science, Fairview M.S., Chicopee, MA

MAKING POLAR CONNECTIONS

By LOLLIE GARAY 2008 STEM IPY PARTICIPANT AND 2007 POLARTREC TEACHER, REDD SCHOOL, HOUSTON, TEXAS

In 2007 I began a life-changing journey that would take me into areas of the world and realms of science that I couldn't have ever imagined being a part of. This voyage began when I set out to sea on the Icebreaker Oden in 2007 with a team of US and Swedish scientists. Our destination? – The Antarctic Seas! For almost 2 months I worked and learned alongside researchers conducting water column and atmospheric studies in the Bellingshausen, Amundsen and Ross Seas off the coast of Antarctica.

I am a classroom teacher from Houston, Texas selected for this amazing adventure through the PolarTREC program managed by the Arctic Research Consortium of the United States (ARCUS). The PolarTREC program teams classroom teachers with scientists conducting research in the Arctic and Antarctic regions. The story of that 2007 Oden Expedition would take more space than I have room for here, so I have referenced the PolarTREC website at the end of this article. My emphasis for now is on how that experience transformed my thinking, for the end of that voyage was really only the beginning. For the last two years I have worked hard to improve my understanding of Polar Science, climate change, and oceanography in a global context.

As Gulf coast residents, it's important to make Polar Science relevant to students in my classroom. My real-life experience with the Oden Expedition raised new questions about global climate change, and together we have explored new ways to make connections. Consequently, I am always looking for new ways to expand my personal knowledge. The International Polar Year generated an extensive amount of information on global and Polar issues and programs. One of those was the University of Massachusetts Polar IPY/STEM Institute. This week-long residential program created by research scientists in Amherst, MA in collaboration with the Climate System Research Center prepares

teachers to implement STEM activities that focus on Polar processes. The Polar Connections Curriculum we worked with prepared us for classroom instruction on a variety of topics from sea ice processes to biology. Moreover, it gave us a tool and the personal connections to researchers that make this program unique.

The common thread to both these programs has been the accessibility to scientists who are willing to reach out to classrooms, and continue to work collaboratively with teachers to bring the science "home".

The common thread to both these programs has been the accessibility to scientists who are willing to reach out to classrooms, and continue to work collaboratively with teachers to bring the science "home". To date, I have developed and conducted 24 Polar Science/ climate related presentations and work shops. Three of those on the local and national level were dedicated solely to activities from the Polar Connections Curriculum. The expansive scope of

this curriculum offers a wealth of inquiry-based activities that utilizes technology and real-time science to engage active learners; and it has given me resources from which to build Polar Literacy in my classroom. As I stated at the onset, my journey continues. With every new discovery, I strengthen the collective knowledge of my audiences and myself, and hopefully open pathways for others to explore!

PolarTREC – www.polarartrec.com

UMASS IPY Stem Institute – <http://umassk.12.net/IPY> ■

Kathleen M. Gorski, Ph.D. Einstein Fellow, 07-08

AN ARCTIC EXPERIENCE

(Editors Note: Kathleen Gorski attended the STEM ED International Polar Year Teacher Professional Development Institute this past summer. We asked her to share her experience as an Einstein Fellow traveling to Greenland in 2008)

The Albert Einstein Distinguished Educator Fellowship Program is a competitive award that brings K-12 STEM educators to Washington, DC in order to provide teachers' perspectives on federal policy and programs. An Einstein Fellow must be flexible, willing to take initiative, and open to diverse opportunities.

Those characteristics were more important than my chemistry background to landing a placement in the National Science Foundation's (NSF) Office of Polar Programs. My tenure during the 4th International Polar Year (IPY) afforded me myriad experiences. There were symposia, talks, conferences, and outreach activities, both directing and attending. None of them held a candle to walking onto a plane that lands with skis, and sleeping on top of the Greenland Ice Sheet!

The capstone – and keystone – event for my Einstein year was the Greenland Education Week Tour 2008; we traveled first to the southwest town of Kangerlussuaq, before flying to the Ice. As part of IPY activities, the Joint Committee of the U.S., Greenland, and Denmark gathered a small group of teachers and students from the 3 countries to survey polar science in action. The research is conducted at NSF's Summit Camp inside the Arctic Circle at 72.6° N 38.5° W and 3200 meters above sea level. It is home to about 50 people when the camp is full. As the lead U.S. teacher, and NSF representative for the group (there were 13 of us), I helped coordinate activities and provide the Greenlanders and Danish folks an opportunity to visit a nearly inaccessible part of their country that is home to crucial research efforts.

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ANOTHER CAREER DIRECTION?

continued from page 1

Professionals measure albedo with an expensive device called a pyranometer. This device is pointed upward and then downward, and the ratio of the energies absorbed is the albedo. A light meter can be used in much the same way. Decades ago, photographers used light meters to determine exposures, but virtually all cameras now have exposure meters built in. Inexpensive light meters are still sold, however, for use in measuring lighting levels in offices, factories, etc. I found a rugged, versatile \$50 meter that worked very well as a pyranometer. This allows for quick easy albedo measurements indoors and outdoors on a wide variety of surfaces. The experiment based on this meter was very successful and met most of criteria. However, a \$50 meter is not affordable for some teachers, especially if you need one for each of several groups of students. More recently, I learned that a light emitting diode (LED) can be used as a light detector if it is connected to a multimeter, and can replace the light meter. This is a “free” experiment if you have an LED and a multimeter. If not, LED’s cost pennies; multimeters start at under \$10 and have many uses.

Most teachers now have access to digital cameras and computers. They are “free” if you already have them, and you can analyze digital photos to determine the relative brightness of different areas, which is a measure of their relative albedos. I took photos of various surfaces with a sheet of Xerox paper in each photo as a standard; its albedo is about 0.6. After trying free and commercial software, I discovered that the free Image J program was amazingly easy to use for this analysis. This was confirmed during our summer institute when the teachers tried the activity.

Someone pointed out that children might not connect light absorption with a temperature increase. After a lot of trial and error, I developed an activity in which white or black paper was taped over the top of a paper or foam dinner plate. A thermometer was placed inside, and a heat lamp was located directly overhead as a light source. The black plate got much warmer than the white one. Also, we changed the arrangement so that the light was incident further from the normal, and found that the temperature rose more slowly. This is a significant effect to understand since even in summer the sun is low in the sky in Polar Regions. Eventually I learned that this experiment has also been developed by many others in varied forms.

My most recent addition to the list of experiments is the simplest and possibly most interesting and relates to both albedo and to microclimates. The polar climate is very severe and challenging for plants and animals. Microclimates occur in places where the temperature, dampness, or wind velocity differs from the surrounding area. This can be due to hills, rocks of various sizes, crevices, depressions, surface colors, or nearby bodies of water. I took a meat thermometer and measured the soil temperature at various places outside on a sunny day: in deep shade under trees, in sunlit grass, mulch, etc. I found a variation of over 10° F among a handful of sites. When we tried this activity during the institute, some teachers also measured the temperatures of various surfaces – concrete, asphalt, etc. – and got very interesting results. I plan to look at ways to extend this experiment for next summer.

I have learned a lot in developing these and other experiments. It is harder than some might imagine developing engaging activities that work and satisfy our list of requirements. If you are interested in learning more about the albedo activities, look at www.umassk12.net/ipy/materials/2009Summer/. Or, if you are a STEM teacher, sign up for next summer’s institute. ■



NANOTECH SUMMER INSTITUTE 2009 PARTICIPANTS

Joanne Aronson, Physical Sci/Chem., Miami Country Day School, Miami, FL
Richard Beauregard, Graphic arts, Aldrich Jr. H.S., Warwick, RI
Paul Benoit, Chemistry/Physical Sci., Littleton H.S., Littleton, NH
James Berlstein, Physics/Astro/Tech., Mount Everett H.S., Sheffield, MA
Kerry Breinlinger, Chemistry, Tantasqua Regional H.S., Fiskdale, MA
Eric Brunelle, Technology, Hanson M.S., Hanson, MA
Josh Copen, Chem/Env. Sci., Putnam Voc Tech H.S., Springfield, MA
Sharon Cumiskey, Integrated Science, Plymouth South M.S., Plymouth, MA
Jan Davagian, Life Science, Sutton MS, Sutton, MA
Julia Fournier-Rea, Biology/Forensic Sci., Longmeadow H.S., Longmeadow, MA
Thomas Kleint, Technology, H.B. Thompson M.S., Syosset, NY
Leo Knox, Technology, HB Thompson M.S., Syosset, NY
Joy Lauer, Physical Sci/Bio/Chem., Dracut Sr. H.S., Dracut, MA
Annamaria Lisotti, Math/Physics, ISI Cavazzi/Liceo Sorbelli, Pavullo (MO) Italy
Heather Mellor, Biology/Oceanography, Exeter H.S, Exeter, NH
Joanne Menard, Science/Technology, Knox Trail Jr. H.S., Spencer, MA

Joe Miano, Chemistry/Physics, Casady School, Oklahoma City, OK
Ruth Miano, Chemistry/Physics, Casady School, Oklahoma City, OK
Beverly Newell, Computer Science/Math, South Hadley H.S., South Hadley, MA
Catherine Niedziela, Chemistry/Env. Sci., Hopkins Academy, Hadley, MA
Sharon Nist, Life/Earth Science, Knox Trail Jr. H.S., Spencer, MA
Carol Osmon, Chem/Physics, Arcadia H.S., Dak Hall, VA
Elizabeth Radwilowicz, Chemistry, Belchertown H.S., Belchertown, MA
Shagufta Raja, Physics/Math, Phillip O. Berry Acad. of Tech., Charlotte, NC
Gayle Roach, Math, Knox Trail Jr. H.S, Spencer, MA
Kristin Steiner, Env Sci/Chemistry, McCann Technical School, North Adams, MA
Amy Sternheim, General Sci., Amherst, MA
Barbara Swanson, Bio/Chem/Env. Sci., Rockport H.S., Rockport, MA
Priscilla Tuttle, Chemistry, Eastport - South Manor H.S., Manorville, NY
Sue Vincent, Science, Brattleboro Unity H.S., Brattleboro, VT
Albert Wooten, Technology, Cranston H.S, Cranston, RI
Tara Yohan, Chem/Bio/Physiology, Amherst Regional H.S., Amherst, MA

NOYCE SCHOLAR JOSH COPEN TRAVELS TO DC

BY JOSH COPEN

This summer I was fortunate to be invited to Washington D.C. to attend the Noyce Teacher Scholarship Program Conference sponsored by the National Science Foundation. This event was one of the highlights of my career in education. I have taught science in the urban setting of Springfield, Massachusetts for 3 years.

Throughout my teaching career I have received a great deal of support and encouragement from both NOYCE and STEM. In essence, the Robert Noyce Teacher Scholarship Program was created under the National Science Foundation Authorization Act of 2002 to respond to the critical need for K-12 teachers of science, technology, engineering, and mathematics (STEM) by encouraging talented STEM students and professionals to pursue teaching careers in elementary and secondary schools in high needs districts. By participating in the NSF conference, I was able to identify and disseminate information about effective practices and strategies for attracting new K-12 STEM teachers that want to make a difference in this challenging field.

Feeling honored, I was eager to join other upcoming STEM teachers and university professors to share both the rewards and challenges associated with educating America's urban youth. The conference took place at the Grand Hyatt



in Washington D.C. and consisted of tours of some of Washington's best museums, listening to several key note speakers, including Steve Robinson, special advisor to the Secretary, U.S. Department of Education, and attending concurrent workshops involving everything from pedagogical techniques to hands on classroom demonstrations. This conference gave me a great deal of zeal toward my commitment to being an urban educator and invigorated me with many great ideas to lead my students through another year of science education. ■

STEM Bridge for Noyce Scholars Ends

The STEM Bridge for Noyce Scholars program has ended. Over the past four school years, 31 undergraduate and graduate students have received up to \$20,000 in annual support for one or two years. In return, they have agreed to teach middle or high school mathematics or science for at least two years in a high-need district for each year that they received a scholarship. The high-need designation applies to many districts, large and small, urban and rural, throughout the United States

...31 undergraduate and graduate students received up to \$20,000 annual support for one or two years... In return, they agreed to teach middle or high school mathematics or science for at least two years in a high-need district for each year they received a scholarship.

The Principal Investigator of this NSF funded project was Allan Feldman (Science Education); co-PI's included Morton Sternheim (STEM Ed), John Francisco (Math Education), and Farshid Hajir (Math).

The Scholars were UMass undergraduates or recent grads. We had some success in recruiting community college transfers. This was aided by an advisory committee which included faculty members and administrators from UMass and from Greenfield, Holyoke, and Springfield Technical Community Colleges.

members. We offered occasional workshops on request from the Scholars, such as one last fall on classroom management. Scholars were also welcomed during and after their studies at our other programs, including the Science and Engineering Saturday Seminars and the various summer institutes.

Many of the Scholars told us that the awards were instrumental in their efforts to become teachers. Here are some comments from a recent survey:

-If it were not for the support from the Noyce Scholar Program, I might not be a teacher. It was the financial boost I needed in order for me to fulfill my student teaching experience.

-The scholarship allowed me to reduce my tuition costs as well as was an incentive to work in a high-needs school district.

-I would not have been able to complete my program without the financial support of the Noyce program. Thanks!

We are hopeful that we will be able to resume this program in the future. ■

The program has provided support in addition to the usual academic program and counseling. We twice held annual dinner meetings with the scholars, PI's, and advisory committee

STEM RAYS:

A UNIQUE FACULTY AND TEACHER PARTNERSHIP EXPLORING GLOBAL ENVIRONMENTAL CHANGE AFTER SCHOOL

BY PROFESSOR ROBIN HARRINGTON
JENNIFER WELBORN



The room was humming. I looked at Robin and we both knew we had arrived at that special place. A place where the students are completely engaged in their own authentic research projects and we simply serve as advisors in their quest. We (Professor Robin Harrington and I) had the unique opportunity to work together on developing and implementing a STEM RAYS after-school club - the first at Amherst Regional Middle School. We say unique because while Robin served as the faculty resource person for teachers who chose Global Environmental Change as their STEM RAYS thread, she also happened to be my student teacher in the Fall of 2008, as part of a career change. Her research focus for the past 25 years was the ecology of invasive plant species. As such, she brought a wealth of knowledge to both the classroom and the after-school club.

Robin: "As a former college professor and researcher, who recently changed careers to become a middle school science teacher, my participation in STEM RAYS allowed me to wear both hats and has made my career transition very rewarding. My research focus for the past 25 years has been the ecology of invasive plant species, a major component of global environmental change. Translating years of research experience into potential research ideas for middle school students was fun. Once they became excited about a topic, they took off running. This has been one of the most gratifying experiences of my new career."

Jennifer: "Working collaboratively with Robin in STEM RAYS was extremely rewarding. In addition to teaching in public school for nearly 20 years, I have a degree in Wildlife and research experience in both Entomology and Wildlife. Robin's expertise in plant biology was invaluable as it enabled our students to pursue challenging and enriching research questions involving both plants and animals."



The end result of our powerful collaboration produced amazing results: all students proudly presented at the STEM RAYS conference at UMASS in May. In addition, six of the projects placed in the top 20 at the Regional Science Fair in North Adams. Of those, 3 projects earned recognition at the State Science Fair in Worcester. The projects emerged directly from students' interests and included: effects of increased temperatures on sea anemones and invasive and native seed germination; monitoring pollution at the nanoscale level using Calcogenide glass; effects of increased UV light on plants, animals, and solar cells; identification of wetlands worldwide and their importance as carbon sinks; effects of increased acidity on the electrical output of sediments containing geobacter; effects of density on the growth of native and invasive seedlings; effects of ozone on sugar and Norway maple seedlings; determining IR reflectance off snow and water using a modified digital camera; and determining heat loss from buildings using a thermal IR camera. ■



STEM RAYS News

We have bad news and good news about STEM RAYS, the after school science program for students in grades 4-8 in Franklin County plus Amherst and Northampton.

The original National Science Foundation grant ends in November, but last year we received a \$312,000 grant from the Massachusetts Board of Higher Education Pipeline Fund to expand and continue the program for this school year. The bad news is that due to the state's fiscal crisis, we will not receive the last 40% of the award, so that the funding will nominally end on February 28, 2010.

The good news is that the program will continue due to some creative rebudgeting and support from STEM Ed and other sources. We have 19 clubs in 15 schools, with approximately 200 students participating. The program will end in May when the students present their results at the science conference at UMass.

The other good news is that STEM RAYS has had a major impact on the participating teachers, students, and schools. We have seen this through a variety of methods: observations of the clubs, an examination of the project

reports at the annual conference, and surveys and interviews with students, teachers, parents, and administrators.

NSF's main original goal was to learn if out-of-school science can increase student interest in STEM subjects and careers. While there is no way to predict what children will do years later, it is clear that STEM RAYS has increased their interest in science, and helped them to develop new ways of thinking about science. ■

More information on STEM RAYS is at www.umassk12.net/rays

STEM RAYS: SPOTLIGHT ON ENGINEERING DESIGN THEME GROUP

Smith College joined the STEM RAYS program in the 2008-2009 school year in collaboration with original STEM RAYS college partners UMASS and Greenfield Community College. The STEM RAYS program seeks to enhance science and engineering experiences and learning opportunities with after school programming. Students and teachers partner with a college faculty member to bring scientific research and/or engineering design experiences to the students in grades 4 through 8. This past school year teachers from 9 different school districts representing 17 different schools participated in the program. The themes for the collaborative research this past year included Global Environmental Change, Birds, Sustainability, and Engineering. The Smith College-sponsored theme group was Engineering and the specific focus was the "engineering design process".

The starting point for the five teachers working in the Engineering theme group was to familiarize themselves with the engineering design process during two Saturdays of professional development led by Susannah Howe, Design Clinic Director of the Picker Engineering Program at Smith College and Tom Gralinski, Science and Engineering Curriculum Specialist in Smith's Office of Educational Outreach. Initially the teachers worked through short-term engineering design problems to better understand the process and then developed a set of short-term and long-term design projects and activities for their students. At monthly theme group meetings teachers expanded their depth of knowledge of the design process by hearing about and discussing topics such as project management, concept generation, concept evaluation, and prototyping techniques. Each teacher implemented a combination of short-term activities with a long-term community-service oriented engineering design project. The enthusiasm, energy, and dedication of the teachers and students this past year was amazing.

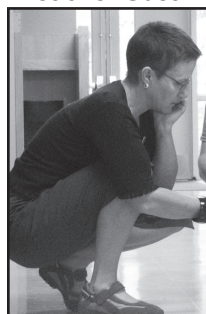
One example of the outstanding student work was from the Swift River Elementary School in New Salem. This group of upper elementary students tackled the problem of excessive noise in their cafetorium. To design a solution to mitigate the noise, they first learned about the science of sound, utilized sound testing equipment, researched sound deadening materials, identified and evaluated design solutions for their situation, created a plan and budget for their chosen solution, and presented their ideas to stakeholders in their school district. As the school year was ending they were preparing to present the plan to their school committee. Throughout the process, the students spoke to various stake-

holders and experts under the watchful eye of teacher Chris Wings, to ensure that their design solutions met the stakeholder needs.



Chris Wings

A second example of the type of project pursued by the Engineering theme group teachers was at Pioneer Valley Middle School. Teacher Susan Fisher and her club



Susan Fisher

sought to redesign student lockers in their middle school. This problem required the students to survey their peers about locker usage and desires, research existing technology and materials available, and talk to school staff (administrators, teachers, and custodians) about funding and logistical constraints. Building on this background, the students generated a wide range of design ideas and ultimately selected a way to easily add shelving to the existing lockers. To validate their design, they established a small manufacturing system to mass produce a number of units, evaluated the shelf performance, and revised their design according to user feedback. Throughout design development, the students created drawings, learned to use certain pieces of equipment, and discussed quality control issues. The initial results from their on-site testing were very promising, but generated a new challenge: most of their fellow students now want the retrofit!

The other Engineering theme group projects also harnessed student/teacher creativity to develop design

solutions for community problems. One group pursued the redesign of a flooded-out faculty lounge and work area. Another developed the design layout for the storage of tools, equipment, and supplies in a new storage shed. One group completed the design and construction of an adjustable greenhouse grow light system needed by another middle school group. And students in another group designed and built a working prototype of a secure, rotating classroom storage system for student use. Students from all groups delivered final poster presentations at the Annual Science Conference in May at UMASS.

Students and teachers immersed themselves in the engineering design process by taking on projects that were meaningful to them and helpful to their school community. They supplemented these design projects with a mix of short-term, fun design activities (balloon-powered cars, paper bridges, computer simulations, etc.) to reinforce the design concepts on a regular basis. A number of the students came to the Smith College campus to hear senior engineering student final presentations, to participate in hands-on design activities, and to learn what the engineering pathway might look like in college and afterwards.

We can't wait to see what problems the students want to work on this year and what innovative solutions they develop. Our collaboration with the teachers and students is tremendously rewarding! ■

Students and teachers immersed themselves in the engineering design process by taking on projects that were meaningful to them and helpful to their school community.

SCIENCE & ENGINEERING SATURDAY SEMINARS

- DESIGNED FOR SCIENCE TEACHERS; NEW TEACHERS ARE ESPECIALLY WELCOME
 - FIVE SATURDAYS EACH TERM; 8:30-1 AT UMASS AMHERST
- EDUCATIONAL MATERIALS, REFRESHMENTS, PARKING, PDP'S INCLUDED
 - ADVANCE REGISTRATION IS REQUIRED; CAPACITY IS LIMITED
 - COST \$30 PER SESSION, \$120 FOR ALL FIVE SESSIONS
- 4 PDP'S PER HALF DAY SESSION; OPTION FOR 3 GRAD CREDITS AT REDUCED COST WITH EXTRA WORK

FALL 2009

Sept. 12 NANOTECHNOLOGY

Mark Tuominen, Physics and Center for Hierarchical Manufacturing

Oct. 3 ILLUMINATING LIFE: WHAT'S NEW AND NOTEWORTHY IN LUMINESCENCE SPECTROSCOPY AND IMAGING? .

Pat O'Hara, Chemistry, Amherst College

Oct. 17 USING ECOLOGY: MAKING SCIENCE REAL

Steve Brewer, Biology

OCT. 31 GLOBAL CLIMATE CHANGE

Julie Brigham-Grette and Ray Bradley, Geosciences.

NOV. 14 SUPPORTING STATISTICAL REASONING FOR MATHEMATICS & SCIENCE STUDENTS

Sandra Madden, Math Education.

NOV. 21 WEATHER CANCELLATION MAKEUP DATE IF NEEDED

PRELIMINARY SPRING 2010 SCHEDULE

Jan. 30 INTERNATIONAL POLAR YEAR

Julie Brigham-Grette, Geosciences

Feb. 6 WHAT IS ELECTRICAL ENGINEERING?

Marinos Vouvakis, Electrical and Computer Engineering

Feb. 27 EMERGING CONTAMINANTS IN WATER AND SEWAGE

Erik Rosenfeldt, Civil and Environmental Engineering

MARCH 6 MOLECULAR VISUALIZATION RESOURCES FOR BIOLOGY AND CHEMISTRY

Frieda Reichsman and Eric Martz, Biochemistry

MARCH 27 GENETICS

Jesse Mager, Veterinary and Animal Sciences

FOR UPDATED LISTINGS AND REGISTRATION INFORMATION, see www.umassk12.net/sess

During Previous Saturday Seminars...



STEM Ed SATURDAY SEMINARS EVALUATED

By PAULA VALENCIK, STEM ED DEPARTMENTAL ASSISTANT

Each semester for the past several years, the STEM Education Institute has sponsored a series of five four-hour workshops on topics related to science and engineering. The workshops were offered to K-12 teachers for either professional development points (PDP's) or graduate credit. Examples of past workshop titles include: Using Birds to Teach Biology, Virus Structure and Evolution, Arsenic in the Environment, Nanotechnology, Polymers All Around Us, Traffic Engineering, Forest Watch, Astronomy and Nature Optics for the Classroom, Solar Cars, GPS and Mapping, Acting and Teaching and Schoolyard Science. At the conclusion of each session, teachers were asked to evaluate the workshop. A total of 553 sets of responses collected between 2006-2009 were reviewed for this study in an effort to evaluate two questions:

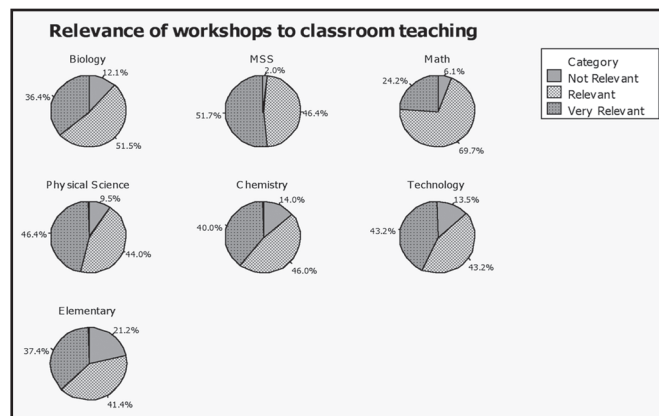
1. Do the data present sufficient evidence to indicate that the relevance of the workshops to classroom teaching varies with the subject taught? If so, for which subject(s) are the workshops most relevant and for which least relevant?
2. Do the data present sufficient evidence to indicate that the likelihood that a teacher will use the workshop activities and materials in his/her classroom varies with the subject taught? If so, in which subjects are the materials most likely to be used in the classroom and in which are they least likely to be used?

Responses to the two target questions were tabulated and evaluated separately, although the response to each question was linked to the subject taught by the teacher. Based on the grade level and subject taught, each teacher was assigned to one of seven "subject" categories. The seven categories were defined as follows, with the number in parentheses denoting the number of teacher responses for each category:

1. Biological Sciences (99) – Environmental Science, Ecology, Life Science, combined Biology and Physics
2. Physical Sciences (84) – Physics, Earth Science, Astronomy
3. Technology (37) – Technology, Engineering, Robotics
4. Chemistry (50) – Chemistry, combined Chemistry and Physics
5. Math (33) – both Middle and High School math
6. Elementary (99) – grades K-5
7. Middle School Science (MSS) (151) – grades 6-8 general science

For each of the two study questions, the Chi-Square Test of Independence was used to evaluate the statistical relationship between the "subject taught" and the teachers' response to the evaluation question. The Chi-Square Test showed that the relevance of the workshops to classroom teaching does vary with the subject taught. Fig. 1 shows the distribution of responses by subject. The Elementary level was ranked with the highest proportion of teachers who indicated that the workshops were "Not Relevant" to classroom teaching. Middle School Science was ranked with the highest proportion of teachers who indicated that the workshops were "Very Relevant" to classroom teaching and Math was the subject category with the greatest proportion of teachers who ranked the workshops as "Relevant" to classroom teaching.

Fig. 1. Side-by-side pie diagrams showing relative proportion of "Not Relevant", "Relevant", and "Very Relevant" responses for each subject category as regards relevance of the workshops to classroom teaching.



Evaluation of the second study question using the Chi-Square Test of Independence also showed that the likelihood that a teacher will use workshop materials and activities in the classroom will vary with the subject and grade level taught (Fig. 2). The Elementary level was ranked with the highest proportion of teachers who were "Not Likely" to use the workshop materials in the classroom. Middle School Science was ranked with both the highest proportion of teachers who were "Very Likely" and those who were "Likely" to use the workshop materials.

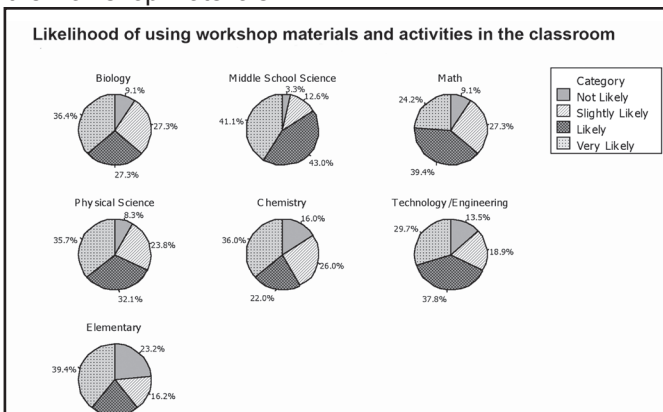


Fig. 2. Side-by-side pie diagrams showing the relative proportion of "Not Likely", "Slightly Likely", "Likely" and "Very Likely" responses for each subject relating to the likelihood that workshop activities and materials would be used in the classroom.

PV STEMNET UNDERGOES CHANGE

BY KATHY BAKER

Many changes have taken place this past year ranging from a need to begin thinking about Network reorganization, change in leadership, and many professional development programs and middle school student experiences that will soon come to an end. In addition, the State legislature has removed funds from the Pipeline initiative, effectively ending State support of the regional networks at the end of this academic year. With so much on the table, the Network has scheduled a meeting with its Executive Committee and Advisory Board in November to begin the discussion around continuing the work of the Network beyond the life of the funding. PV STEMNET "Pipeline" money is slated to end in March 2010 and Massachusetts Mathematics and Science Partnership money will end in August 2010.

In addition to making plans to sustain the Network beyond the life of the grant, the person who has spearheaded the Network since 2004, Allan Feldman, has retired from the University and taken a position at the University of South Florida. As an emeritus professor at UMass, Allan is continuing as Principal Investigator of the two PV STEMNET grants. Professor Mort Sternheim continues as co-PI and Kathy Baker as project manager.

This past academic year the Network sponsored a Showcase and Symposium at Holyoke Community College.

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Participants at this event provided attendees with information on 50 STEM programs operating in the Pioneer Valley. The Showcase and Symposium was well attended and saw more than 100 educators from public schools and institutions of higher education participating. The 2nd Annual Showcase and Symposium has been scheduled for November 4, 2009 from 2:30 to 4:00 PM at Holyoke Community College.

This year's Symposium will showcase presentations from public schools, higher education institutions, and area businesses. Last year the symposium was an opportunity for people in the Pioneer Valley to see the wonderful STEM work being done by so many groups that are involved with the Pioneer Valley STEM Pipeline.

The Network also sponsored 5 graduate-level courses this summer for middle school teachers: Robotics for Middle School Teachers, Forensics for Middle School Teachers, Understanding Division and Fractions, Integrating Mathematics

and Physics for Middle School Teachers, and Discrete Math for Middle School Teachers. Graduate level courses were for 3 credits and also include 20 hours of follow-up beginning this fall. This year's courses were well attended by 75 public school educators who have used these courses towards advanced degrees and new certification requirements.

Part of the Pipeline's goal was to provide area middle school students with hands-on exposure to careers in STEM fields.

A "summer camp" for middle school students was held at Springfield College under the direction of Dr. Peter Polito. Students from the Springfield Public Schools were exposed to careers in Pre-Veterinary and Animal Science, Engineering /Robotics, Environmental Science/Natural Resources, Forensics, and Biotechnology. 25 middle school students from Springfield benefited from their experiences in this "Emerging Scientists and Mathematicians" Summer Camp. Beginning in the Fall 2009, summer camp participants will participate in several follow-up workshops at the college.

One of the final programs of the Pipeline grant has been developed by Heather Lavigne from WGBY – Educational Television. Beginning in late fall WGBY will be sponsoring an online media course that will be focused around STEM media subjects. Teachers who participate will have the opportunity to view and utilize in their classrooms a wide-range of television media made available to them from WGBY. This course will also offer 3 graduate-level credits from Westfield State College.

In November the Executive Committee and the Advisory Board will hear reports from the program evaluator and the instructors in charge of the summer programs, and they will begin to plan for the Pipeline's future in the Pioneer Valley. ■

continued from page 5

AN ARCTIC EXPERIENCE

We slept in Arctic tents, launched a weather balloon for NOAA, stood in awe at the bottom of a snow pit, where the layers represented thousands of years. We ate in "Big House" with the scientists. It is the main facility that functions as dining hall, message center, coffee bar and entertainment center. It's a building on legs that can be jacked up to keep it free from accumulating snow. We traveled on snow machines to the outreaches of the camp, and toured all the labs studying atmospheric and snow parameters, current and long ago.

In addition to visiting Summit, we also were able to visit Russell Glacier. We were entranced by ice calving, as well as the flora on the slopes leading to the glacier waters below it. We traveled to Kellyville, a facility that uses radar and lasers to examine the pristine skies in the Arctic for astronomical, as well as weather data.

These many and varied glimpses into Polar research enabled all participants to better understand and gain a full picture of our planet's climate. More importantly, it permitted a very diverse group of people to work and laugh together, and understand how we are also instruments in developing this important understanding. ■

STEM Ed PEOPLE UPDATE

ALLAN FELDMAN

Allan Feldman, who has been a key part of most STEM Ed programs for many years, has left UMass. He and his wife, Environmental Engineering Professor Sarina Ergas, have accepted faculty positions at the University of South Florida in Tampa. Allan has officially retired from UMass, and as a Professor Emeritus, he can continue to advise grad students and manage grants at UMass.

Allan joined the School of Education Faculty in 1993. He had taught math, physics, and middle school science in New York, New Jersey and Pennsylvania public and private schools from 1972-1989, and then completed a doctorate in science education at Stanford University before coming to UMass.

Once he came to UMass, Allan made a special effort to partner with people in the sciences who were interested in K12 education. He worked with Bill Gerace in Physics, who for many years led a program in physics education research, and with several people in Geosciences and other departments. He was a principal investigator or faculty participant in a series of STEM Ed programs: STEMTEC, the 21 college program designed to produce more, better prepared, more diverse teachers; the STEM Connections GK12 program that brought science and engineering graduate students into middle school classrooms to introduce students and teachers to research; STEM Bridge for Noyce Scholars which supported students preparing to teach math and science; STEM ACT, a conference on alternative certification for science teachers, and STEM RAYS, our after school science clubs.

Allan's efforts to build bridges across the campus are best illustrated by the Davis mine project. This was a unique collaborative effort of five UMass professors from four departments and Colleges, including Allan from the School of Ed, which studied the environmental impact of acid leaching from an abandoned iron pyrite mine. He coordinated the participation of science teachers in this research project.

Allan also played an important role in improving math and science teaching in the region beyond his teaching and advising. He led the effort to develop the Pioneer Valley PreK-16 STEM Pipeline Network: a collaboration of school districts, institutions of higher education, and businesses that provides professional development for teachers and afterschool activities for students. He will still be active in the Network during the current academic year and plans to attend its meeting this fall.

Despite the distance, we plan to continue working with Allan. In fact, we have a joint UMass - USF proposal pending at NSF.



RICHARD YURETICH



Geosciences Professor Richard Yuretich is on leave from UMass and serving as a program officer at the National Science Foundation in the Washington area. He assumed this position in June, 2008, and plans to return to Amherst in May, 2010.

Richard received his doctorate in Geology at Princeton in 1976. After brief stints at Gulf Oil and SUNY Oneonta, he came to UMass in 1980. He has been involved in STEM Ed programs since its earliest days, starting with the NSF/Five Colleges SpaceMet project in 1989. He was a key part of most of our projects since then, included the NSF/Five Colleges 5C5E, STEMTEC, Planet Earth, GK12 STEM Connections, and the NASA STEM Earth Connections programs.

We look forward to his return to UMass and to STEM Ed. ■

ADVENTURES IN CYBERSPACE

We send out a lot of announcements on programs of interest to teachers. Recently one came back with following message:

*The following addresses had permanent fatal errors -----
(reason: 554 5.7.1 Message cannot be accepted, content filter
rejection subject contains "cialis")*

The subject line said: STEM Ed Announcement: MCAS Test Development SpeCIALIST Position

STEM Ed

Newsletter of the
STEM Ed Institute



225 Hasbrouck Laboratory
University of Massachusetts
Amherst, MA 01003
129509

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2009-2010 SCHEDULE

STEM TUESDAY SEMINARS: 4PM (3:45 PM refreshments) ; first and third Tuesdays of each month of academic year
Hasbrouck 138
Everyone is welcome; no reservations are needed, and there is no charge.
Parking is available in the Campus Center Garage.

INVITING EVERYONE IN: LEGO WEDO AS A FRIENDLY STEM ENVIRONMENT FOR EARLY ELEMENTARY SCHOOL TEACHERS AND STUDENTS

SEPTEMBER 15 Catherine Helgoe, Senior Project Mgr, Creative Research and Development, LEGO Education.

EVOLUTION IN AMERICA: A SHORT HISTORY OF THE FIRST 150 YEARS

OCTOBER 6 Barry Werth, Northampton writer

COMING UP:

DNA & PROTEIN 3D STRUCTURE FOR HIGH SCHOOL TEACHERS

OCTOBER 27 Eric Martz, Professor Emeritus, Microbiology, University of Massachusetts

Ready-to-use software, tutorials, and lesson plans offer interactive, rotating, zooming 3D models of high-impact macromolecules such as influenza neuraminidase and Tamiflu, DNA, antibody, hemoglobin, HIV-protease and inhibitor drug, lipid bilayers and channels. BioMolecular Explorer 3D features molecules that dovetail into high school curricula. Proteopedia.Org, a new wiki with Jmol, makes it easy to author new 3D structure tutorials which are immediately online. SMART Teams engage students in the design of physical molecular models with researchers. Transmissionist tutorials vs. discovery-based learning will be contrasted. Molecular Workbench from the Concord Consortium exemplifies the latter, and has built-in report-generation and assessment tools. All software is free, works in web browsers on Windows or Macs without installing anything except java, and is available from <http://HighSchool.MolviZ.Org>

NOVEMBER 3 Steve Brewer, Dept. of Biology, University of Massachusetts

NOVEMBER 17 Don Wise, Dept. of Geosciences, University of Massachusetts

SCIENCE EDUCATION AND THE CHALLENGE OF ISLAMIC CREATIONISM

DECEMBER 1 Salman Hameed, Integrated Science and Humanities, Hampshire College

While the spread of creationism (and its Intelligent Design incarnation) remain a concern in the West, it is a far more serious issue in the Islamic world. Whereas, Christian creationist movements have failed repeatedly to bring a change in the educational system of the US, Islamic creationists have a serious opportunity to succeed. At first glance, the Islamic debate over evolution may appear to be a replay of the western reaction to Darwinism. However, there are some key differences. For example, young earth creationism - the idea that the world was created some time within the last ten thousand years - is completely absent in the Muslim world. I will highlight some of the key features of contemporary Islamic creationism and compare it with creationism in the US. I will also address how biological evolution is being taught in schools and colleges in various Muslim countries.

2010 NANOTECHNOLOGY SUMMER INSTITUTE FOR TEACHERS - June 28-July 2

see web for details: www.umassk12.net/nano

2010 STEM IPY SUMMER INSTITUTE FOR TEACHERS - July 12-16

see web for details: www.umassk12.net/ipy